has fulfilled his share of the work. It must be confessed, however, that one misses in every chapter, almost on every page, a reference to the work which has been done on similar lines by the famous teachers and lecturers of England and America. It is doubtless true that the apparatus described in this book is that most generally available for German teachers; but in countless cases various improvements made by lecturers of other countries would be of great advantage in the teaching of physics in German institutions.

Müller-Pouillet, Lehrbuch der Physik. Edited by LEOPOLD PFAUNDLER. Tenth edition. Volume I. Vieweg, Brunswick. 1905.

In this tenth edition of this well-known standard book on physics, the editor has received the cooperation, in various chapters, of Lummer, Wassmuth, Perntner, Drucker, Kaufmann and Nippoldt, and undoubtedly the entire work when it is published will be much more complete than in the past. In the volume before us, which is devoted to 'Mechanics and Acoustics,' the number of pages and number of illustrations are less than in the previous edition; but the size of the pages has been enlarged, and the illustrations are all that could be desired. The book is designed not specially for students of physics, but for students of natural history, medicine and pharmacy as well, and also for use by makers and designers of physical apparatus. It fulfils its purpose admirably, giving many interesting details in regard to the construction of the apparatus and the theory of the experiments.

In this first volume it is impossible to give unlimited praise, owing to the almost complete absence of reference to the work of English students, and also to the fact that so few references are given to recent work. To a student who wishes to become acquainted with the main phenomena of physics, and who is not specially interested in the most recent theories, this volume will prove most valuable. The former edition of this treatise on physics has long filled a place of its own in all libraries, and it is undoubtedly true that the present edition will be even more acceptable.

J. S. AMES.

SCIENTIFIC JOURNALS AND ARTICLES.

THE May number of the *Journal of Nervous and Mental Disease* opens with a study of cerebellar tumors and their treatment by Drs. J. J. Putnam and G. A. Waterman. A number of operations for the relief of such tumors are reported, in three of which the results were decidedly satisfactory. Dr. E. B. Angell contributes a paper on hypesthesia and hypalgesia and their significance in functional nervous disturbances, and under the title, 'The Coming of Psychasthenia' Dr. Blumer discusses the importance of nomenclature in nervous and mental disease and advocates the adoption of Janet's 'Psychasthenia.'

THE first attempt to list and classify the Diptera of Minnesota has been made this year in the shape of the Annual Report of the Minnesota State Entomologist. The report is illustrated with drawings of various species of flies and two excellent colored plates. Since this work has come from the press seventy-five additional species have been collected within the boundaries of the state. These have been named and listed, and sent to entomologists and others likely to be interested. Any one who has not already received the report and the appendix who desires them can obtain the same by writing to Mr. F. L. Washburn, State Experiment Station, St. Anthony Park, Minn. Cloth-bound report requires eight cents for postage, paper-bound copies six cents.

THE Gebrüder Bornträger, of Halle, announce the publication of a *Zeitschrift für Gletcherkunde,* which is to be the organ of International Glacier Commission and will be edited by Professor Edouard Brückner, of the University of Halle. The journal will appear at irregular intervals, the subscription price being sixteen Marks for a volume of five numbers.

SOCIETIES AND ACADEMIES.

THE TORREY BOTANICAL CLUB.

THE club met on April 25 in the museum building at the New York Botanical Garden. President Rusby presided and there was an attendance of sixteen.

Notice of the coming botanical symposium to be held from July 2 to 9, 1906, at Mountain Lodge, Little Moose Lake, Old Forge, N. Y., was read.

Mr. H. A. Gleason presented a paper illustrated by many photographs, on 'Some Phytogeographical Features of the Prairies.'

An eastern extension of the great western prairies reaches across Iowa into Illinois and Indiana and portions of the adjoining states. Its flora is characterized by large numbers of western plants, although a majority of the species are of eastern distribution and constitute a derived element of the flora. The origin of the prairies has been referred to the character of the soil, the distribution and amount of rainfall, the direction of the prevailing winds, the grazing of bison and to forest fires. Each of these has probably had some influence in accelerating or retarding the invasion of the prairie or forest after the retreat of the continental ice sheet, but the most important factor of all is historical rather than physical in nature. At the close of the glacial period the territory since occupied by prairies was opened first to invasion from the southwest, a region of climatic prairies, and subsequently to invasion from the climatic forests of the southeast. The two floras, on meeting, adjusted themselves to each other and to the physical factors of the environment, so that the forests occupied the bluffs and valleys along the streams, and the prairies the high lands between them. The climate and soil were adapted to the growth of the forest, so that, until extensive cultivation was begun, the prairie was gradually being displaced.

A comparatively restricted area along the Illinois River is occupied by sand deposits covered with a vegetation essentially similar to that of the sand-hill region of Nebraska, and entirely different from that of the dunes at the head of Lake Michigan.

After an interesting discussion of Mr. Gleason's paper, Dr. Rusby exhibited various plants used as food by the Indians. Among these were young shoots of the cat-tail, specimens of bitter-root used by the Indians of the northwest, and Kouse—which consists of several species of *Lomatium* (*L. Canbyi* and *L. Kous*) and is an important article of Indian diet. Dr. Rusby also spoke of the use by the Indians of the young buds of the beech tree, which are edible, when cooked, at any date after the first of January.

Dr. N. L. Britton exhibited fruits of the palm *Acrocomia media* Cook, recently collected by him in Porto Rico,, and remarked on the relationships and distribution of this species, referring to the fine specimen of the plant growing in the palm collections of the garden, brought by Mr. Percy Wilson from that island several years ago. He stated that his observations on this tree showed that the trunk does not invariably bulge above the base as thought by Mr. Cook at the time he described the species (*Bull. Torrey Club,* 28: 566), a small proportion of the trees being quite columnar from the base up. He further reported that the *Acrocomia* of St. Kitts, collected by Mr. Cowell and himself in 1901 is identical with the Porto Rico species, and that it also occurs on the French Antilles, as illustrated by specimens received from Père Duss. The tree is altogether different from the spindle-shaped *Acrocomia fusiformis* of Cuba, and seems to be more closely related to the Jamaican *A. aculeata.*

C. Stuart Gager,
Secretary.

THE PHILOSOPHICAL SOCIETY OF WASHINGTON.

The 617th meeting was held on April 7, 1906, with President Abbe in the chair.

Mr. W. D. Lambert presented 'A Generalized Trigonometric Solution of the Cubic.'

In the trigonometric solution of the cubic each case is solved by a device peculiar to itself. If an attempt is made to apply any method to a case for which it is not intended the angles corresponding to the trigonometric functions become complex or imaginary. If, however, we have a means of calculating these angles from tables of trigonometric and hyperbolic functions the method could be generalized, and would apply even when the coefficients are complex. Expressions—not new, but not generally known—for the angle corresponding to a complex sine were deduced. By the use of these, the method heretofore

confined to the 'irreducible case' will apply to all cubics, and for numerical calculation this process is as short as any other trigonometric solution, and has the advantages of a uniform procedure. If, in order to use only trigonometric functions, we introduce the auxiliary Gudermannian angle to calculate the hyperbolic functions that occur, the formulas reduce, in the case of real coefficients, to the ones commonly given for cases other than the irreducible.

Mr. A. Press spoke by invitation on 'Some Problems in Electrical Design.'

The question of heat-flow and temperature-rise was dealt with for the direct-current dynamo, the alternater, turbo-alternater and induction motor. It was shown that each type of machine comprises an entirely different physical problem, and that the enormous discrepancies between ordinary theory and practise rested on an incomplete application of Fourier's theorem of conservation of heat-flow. The closed types of machines were also pointed out as again offering a new series of problems.

With respect to sound problems of dynamo electric apparatus very little work had been done, although a satisfactory theory of these phenomena would be greatly welcomed by the engineering profession. In all probability there were radial vibrations set up in the laminæ of the cores, and, by virtue of the alternating character of the air-flow stream lines in the cores, sounds induced thereby superimposed upon the other sounds gave the chief characteristic difference between the kind of note emitted by the alternating types of machines and that by direct current types. There were problems of air-flow that also needed elucidation. These latter had intimate relationship with temperature-rise problems. The method of attack in factory work has necessarily to be modified in accordance with whatever tests have already been made, rather than have the experiments made to comply with some preconceived plan. In consequence of this the physical constants may be very wide of the truth.

Problems dealing with the determination of self-induction and resistance for very high frequencies (2,000 per second) had also to be attacked. As far as known only two types of conductor-arrangements have been completely solved. They are, respectively, the round conductor in free air and the rectangular conductor surrounded on three sides by iron. Frictional problems were also discussed, air friction and bearing friction being more specifically dealt with.

This paper led to an interesting discussion, especially with respect to the relative contributions made by the theoretical students of electricity and the constructors of machinery.

Informally Mr. White spoke of the galvanometer as a motor.

THE meeting falling due on April 21 was omitted on account of the meeting on April 20 and 21 of the American Physical Society. A luncheon was served by the Philosophical Society on Saturday at the Bureau of Standards, and in the evening a dinner in honor of Professor H. A. Lorentz, of Leyden, was attended by about fifty persons. Vice-president Bauer presided and Professor Newcomb was toastmaster.

THE 618th meeting was held on May 5, 1906.

It was announced that the society had accepted an invitation to be represented at the semicentennial celebration of the St. Louis Academy of Sciences on March 10, and had appointed Dr. W J McGee to represent it; a brief report from him was read and the medal sent by the academy was exhibited. Also the invitation to be represented at the bicentennial Franklin celebration in Philadelphia on April 18–20 had been accepted and the president had been appointed in response to it; he made an oral report.

Mr. W. J. Humphreys described some 'Recent Experiments on Arc Spectra under Heavy Pressures.' The Zeeman effect leads to the conclusion that an atom must have a magnetic field; therefore, a change in pressure should cause a change in the spectrum. The older experiments with high pressures were very unsatisfactory, being tedious and the arc unsteady. The speaker used a steel bomb, with a quartz window and a rotating electrode, and

a Rowland concave grating with photographic appliances; the work was comparatively rapid and the results highly accurate. Nearly all the metals had been used. The displacement of the lines toward the red as the pressure increased came out very clearly in the lantern slides and the magnitude of the shift was stated to be related to the periodic law.

Mr. N. E. Dorsey discussed 'A Possible Relation connecting Surface Tension, Molecular Weight and Dielectric Constant.' He pointed out that KM^2T/D^2 is of the same order of magnitude for all the liquids for which sufficient data are obtainable, and gave reasons for suspecting that such should be the case. Here K = dielectric constant, T = surface tension, M = molecular weight and D = density.

The president presented informally the unsolved physical problem of the formation of hailstones.

CHARLES K. WEAD,
Secretary.

THE ELISHA MITCHELL SCIENTIFIC SOCIETY OF THE UNIVERSITY OF NORTH CAROLINA.

THE 164th meeting was held on Tuesday evening, March 13, at 7:30 o'clock. Dr. F. P. Venable, president of the university, addressed the society on 'The Progress of Chemical Research in the United States.' Dr. Venable gave this address recently in New Orleans before the American Chemical Society as its retiring president.

The 165th meeting was held on Tuesday evening, April 10, at 7:30 o'clock. Professor William Cain, professor of mathematics and a civil engineer, gave the society a most interesting account of 'The Panama Canal.'

The 166th meeting was held on Tuesday evening, May 8, at 7:30 o'clock. The following papers were given:

MR. N. C. CURTIS: 'An Architectural Scheme for the University Buildings.'

PROFESSOR C. H. HERTY: 'Recent Work in Osmosis.'

A. S. WHEELER,
Recording Secretary.

THE MISSOURI SOCIETY OF TEACHERS OF MATHEMATICS AND SCIENCE.

THE second annual meeting of the Missouri Society of Teachers of Mathematics was held in Columbia, Mo., May 5, 1906. This society was organized a little over a year ago exclusively for teachers of mathematics. In response to the request of many teachers of science steps were taken which resulted in the adoption at the last meeting of amendments to the constitution, enlarging the scope of the society so as to include teachers of science, and providing for meetings of a division of mathematics and a division of science in addition to joint meetings. Provision was made to send delegates to cooperate in the completion of the organization of a national society. A committee was appointed to cooperate with committees from similar societies to discuss matters relating to instruction in elementary physics.

The program of the day consisted of a business meeting and a forenoon and afternoon meeting of each of the two divisions. Mr. H. C. Harvey, of Kirksville, presided at the business meeting and at the division of mathematics. Mr. F. N. Peters presided at the division of science. Mr. J. W. Withers was elected president for the coming year. In addition to individual papers in each division, a round-table discussion of the teaching of elementary algebra was held which was participated in also by a number of teachers of physics. On the whole, a very encouraging interest was manifested in the work of the society.

A complete program and abstracts of the papers presented will be published in *School Science and Mathematics*, the official organ of the society.

L. D. AMES,
Secretary.

DISCUSSION AND CORRESPONDENCE.

A PLEA TO MAKE THE SMITHSONIAN INSTITUTION A NATIONAL INSTITUTE OF RESEARCH.

THERE is great need in this country to-day of a place where advanced investigators can go, as they can to the great German universities, and carry out researches in an atmosphere of investigation, such as is only created by the friction of young and vigorous but trained intellects.

In our universities the pedagogic element is